breast cancer, the principles of the present invention can also be advantageously applied to other diseases of other body parts.

Claims:

What is claimed is:

1. A system for diagnosing the possibility of disease in one of a first body part and a second substantially similar body part by impedance measurements, the system comprising

a first body part module for injecting a first current into the first body part and for receiving a corresponding first voltage signal;

a second body part module for injecting a second current into the second body part and for receiving a corresponding second voltage signal;

a correction module for obtaining a first correction factor for the first body part and a second correction factor for the second body part, the first and second correction factors accounting for impedances inherent in non-body part sources; and

an impedance module for calculating a first impedance from the first current, the first voltage signal and the first correction factor, and for calculating a second impedance from the second current, the second voltage signal and the second correction factor, wherein the first and second impedances are used to diagnose the possibility of disease.

2. The system of claim 1, wherein the non-body part sources that give rise to inherent impedances include skin covering the body parts and parts of the system.

3. The system of claim 1, wherein the correction module includes

a magnitude correction module for calculating a magnitude correction factor; and

a phase correction module for calculating a phase correction factor, where the first correction factor is composed of the magnitude correction factor and the phase correction factor.

4. The system of claim 3, wherein the correction module includes a magnitude correction table to calculate the magnitude correction factor, the magnitude correction table containing calibration impedance magnitude ($|Z_{\mathrm{cal}}|$) data and associated magnitude correction factor ($C_{\mathrm{mag}}(|Z_{\mathrm{cal}}|)$) data.

5. The system of claim 4, further comprising a calibration apparatus to form the magnitude correction table.

6. The system of claim 5, wherein the calibration apparatus includes an electrical model of the first body part, a variable interface resistance and the impedance module.

7. The system of claim 6, wherein the impedance module includes a bipolar unit for calculating a bipolar impedance, Z_{BP}, from a bipolar voltage measurement made by the first body part module on the first body part, the magnitude of the bipolar impedance used by the correction module to obtain the correction factor.

8. The system of claim 7, wherein the correction module uses the magnitude correction table and the magnitude of the bipolar impedance to obtain the magnitude correction factor, which is given by $C_{mag}(|Z_{BP}|)$.

9. The system of claim 8, wherein an uncorrected first impedance, Z^{raw}, is calculated by the impedance module from the first current and the first voltage signal.

10. The system of claim 9, wherein the magnitude of the first impedance, Z, is calculated by the impedance module according to

$$|Z| = C_{mag}(|Z_{BP}|) \times |Z^{raw}|.$$

11. The system of claim 3, wherein the correction module includes a phase correction table to calculate the phase correction factor, the phase correction table containing calibration impedance magnitude ($|Z_{cal}|$) data and associated phase correction factor ($C_{ph}(|Z_{cal}|)$) data.

12. The system of claim 11, further comprising a calibration apparatus to form the phase correction table.

13. The system of claim 12, wherein the calibration apparatus includes an electrical model of the first body part, a variable interface resistance and the impedance module.

14. The system of claim 13, wherein the impedance module includes a bipolar unit for calculating a bipolar impedance, Z_{BP}, from a bipolar voltage measurement made by the first body part module on the first body part, the magnitude of the bipolar impedance used by the correction module to obtain the correction factor.

15. The system of claim 14, wherein the correction module uses the information from the phase correction table and the magnitude of the bipolar impedance to obtain the phase correction factor $C_{\mathrm{ph}}(|Z_{\mathrm{BP}}|)$.

16. The system of claim 15, wherein an uncorrected first impedance, Z^{unc}, is calculated by the impedance module from the first current and the first voltage signal.

17. The system of claim 16, wherein the phase of the first impedance, Z, is calculated by the impedance module according to

$$\arg(Z) = C_{\arg}(Z_{\mathrm{BP}}) \times \arg(Z^{\mathrm{unc}}).$$

18. A method for diagnosing the possibility of disease in one of a first body part and a second substantially similar body part by impedance measurements, the method comprising

injecting a first current into the first body part;

receiving a corresponding first voltage signal;

injecting a second current into the second body part;

receiving a corresponding second voltage signal;

obtaining a first correction factor for the first body part and a second correction factor for the second body part, the first and second correction factors accounting for impedances inherent in non-body part sources;

calculating a first impedance from the first current, the first voltage signal and the first correction factor with an impedance module; and

calculating a second impedance from the second current, the second voltage signal and the second correction factor with the impedance module, wherein the first and second impedances are used to diagnose the possibility of disease.

19. The method of claim 18, wherein the non-body part sources that give rise to inherent impedances include skin covering the body parts and parts of the system.

20. The method of claim 18, wherein the step of obtaining includes

calculating a magnitude correction factor; and

calculating a phase correction factor, where the first correction factor is composed of the magnitude correction factor and the phase correction factor.

21. The method of claim 20, wherein the step of calculating a magnitude correction factor includes using a magnitude correction table, the magnitude correction table containing calibration impedance magnitude ($|Z_{\mathrm{cal}}|$) data and associated magnitude correction factor ($C_{\mathrm{mag}}(|Z_{\mathrm{cal}}|)$) data.

22. The method of claim 21, further comprising forming the magnitude correction table with a calibration apparatus that includes an electrical model of the first body part, a variable interface resistance and the impedance module.

23. The method of claim 22, further comprising

performing a bipolar voltage measurement on the first body part; and

calculating a bipolar impedance, Z_{BP}, from the bipolar voltage, the magnitude of the bipolar impedance used to obtain the correction factor.

24. The method of claim 23, wherein the magnitude correction table and the magnitude of the bipolar impedance are used to obtain the magnitude correction factor, which is given by $C_{\mathrm{mag}}(|Z_{\mathrm{BP}}|)$.

25. The method of claim 24, further comprising calculating an uncorrected first impedance, Z^{raw}, from the first current and the first voltage signal.

26. The method of claim 25, wherein the magnitude of the first impedance, Z, is given by

$$|Z| = C_{\text{mag}}(|Z_{\text{BP}}|) \times |Z^{\text{raw}}|.$$

27. The method of claim 20, wherein the step of calculating a phase correction factor includes using a phase correction table to calculate the phase correction factor, the phase correction table containing calibration impedance magnitude ($|Z_{\text{cal}}|$) data and associated phase correction factor ($C_{\text{ph}}(|Z_{\text{cal}}|)$) data.

28. The method of claim 27, further comprising forming the phase correction table with a calibration apparatus that includes an electrical model of the first body part, a variable interface resistance and the impedance module.

29. The method of claim 28, further comprising

performing a bipolar voltage measurement on the first body part; and

calculating a bipolar impedance, Z_{BP}, from the bipolar voltage, the magnitude of the bipolar impedance used to obtain the correction factor.

30. The method of claim 29, wherein the phase correction table and the magnitude of the bipolar impedance are used to obtain the phase correction factor, which is given by $C_{\mathrm{ph}}(|Z_{\mathrm{BP}}|)$.

31. The method of claim 30, further comprising calculating an uncorrected first impedance, Z^{raw}, from the first current and the first voltage signal.

32. The method of claim 31, wherein the phase of the first impedance, Z, is given by

$$\arg(\mathrm{Z}) = C_{\arg}(Z_{\mathrm{BP}}) \times \arg(Z^{\mathrm{unc}})$$